presence of a very much larger percentage of dissociation"; and on p. 432, "The reader will have no difficulty in comprehending books that still use the nomenclature of the theory of electrolytic dissociation by remembering that the term *ion* as used in expressing chemical change means the same as atom or radical" (*sic*).

The periodic law is discussed in Chapter XX., but in the arrangement of the descriptive matter it is entirely ignored. This is a great drawback, as inorganic chemistry without the periodic law and the ionic hypothesis becomes a mere jumble of disconnected facts, difficult to remember, and still more difficult to assimilate. Otherwise the book contains as much pure chemistry as a student of medicine or engineering, who can devote only one year to the subject, requires. There are also short accounts of the chief processes in applied chemistry.

OUR BOOK SHELF.

Super-organic Evolution. Nature and the Social Problem. By Dr. E. Lluria. With a preface by Dr. D. Santiago Raman y Cajal. Translated by Rachel Challice and D. H. Lambert. Pp. xix+233. (London: Williams and Norgate, 1910.) Price 7*s.* 6*d.* net.

"MAN is a product of universal mechanics."

"*The solution of the social problem is contained in the law of evolution.*"

"There exists an irrefragable law which has made man out of a conglomeration of matter, and this same law, sooner or later, will have to be followed, in order that man himself may attain the state of happiness that is his legitimate aspiration."

These aphorisms lie at the root of Dr. Lluria's philosophy. The researches of Don Santiago Raman y Cajal into the phylogeny and ontology of the nervous system have greatly impressed him, and a third of the volume is occupied with an account of them. He assumes that the nervous system of man will continue to increase in complexity. "The brain of man still continues its psychic evolution." While agreeing that this is "a conclusion of paramount value," we fail to trace the logical steps by which it is reached, and the same may be said of the further inference, "In society, super-organic organism, the rapidity of change will be greater than in any other."

With the best will in the world, it is not easy always to follow the author, as, *e.g.*, when he tells us that "Society lives in a profound error as to property. It has chosen the paltry medium of money instead of the grand inheritance of Nature, which belongs to it by right, confirmed by the theory of evolution." But it is not only society that is to blame. "The responsibility falls particularly on many men of science who have not understood the theory of evolution, giving it, for example, such a false and iniquitous interpretation as *the struggle for existence*—a dreadful distortion of the natural course of ideas."

It is unfortunate that the translator is evidently unfamiliar with the technical terminology which is inseparable from a treatise of this description. There is no index.

The Romance of Modern Astronomy, describing in Simple but Exact Language the Wonders of the Heavens. By Hector Macpherson, Jun. Pp. 333. (London: Seeley and Co., Limited, 1911.) Price 5*s.*

COMMENCING with a chapter on our place in the universe, the author proceeds in the established sequence with chapters on the earth's motions, the sun, Mercury, Venus, &c., completing the discussion of the solar system with comets and shooting-stars. At more remote distances the suns of space, stellar motions and systems, and nebulæ are the subjects claiming the writer's pen. Some forty pages are devoted to tides, the spectrum and other incidental subjects, while five chapters deal with popular aspects of astronomical history.

The treatment, though generally clear and accurate, seldom rises above the commonplace. A feature which cannot be commended is the persistent introduction of somewhat lengthy quotations from other writers on astronomy. This method of providing "purple patches" discounts the individuality of the writer, whether it be due to modesty or otherwise.

Though steering clear of error in his elementary exposition, the author is not guiltless of loose statements, such as that silver-on-glass reflectors "have a light-gathering power far exceeding the telescopes whose mirrors are constructed of speculum metal."

Many of the illustrations are new, and, on the whole, well done, the artist being successful in finding picturesque settings for some of the more common astronomical happenings. The frontispiece, however, is very misleading; here an enlarged drawing of the head of Halley's comet fills the picture above a portion of landscape, put in doubtless for effect, the whole giving the impression that the coma stretched from zenith to horizon.

The Practice of Soft Cheesemaking. A Guide to the Manufacture of Soft Cheese and Preparation of Cheese for Market. By C. W. Walker-Tisdale and T. R. Robinson. Second edition, revised. Pp. 94. (London: Office of the *Dairy World,* 1910.) Price 1*s.* net.

A SECOND edition of this little book having been called for, the authors have taken advantage of the opportunity for introducing a certain amount of new matter. With true commercial instinct, they have put in a section describing fully the preparation of Bulgarian sour milk and sour cheese, but their chief object is to give a number of recipes for making soft cheese—often known as cream cheese—likely to sell well and at a good profit.

Soft cheese is a much simpler matter for the producer than ordinary cheese. No great capital or strength are required; the uniformity desirable for butter-making is not needed, so that comparatively small volumes of milk suffice, and the best demand exists precisely at the time when milk is in greatest abundance, *i.e.* in spring and summer. It is therefore essentially a product that the small holder can go in for, and the recognition of this fact by the authors adds greatly to the value of the book. The process of manufacture is simple, and consists merely in adding rennet to milk or to a mixture of milk and cream, then separating the coagulum, and allowing it to drain. There are, however, numerous details that require attention, but these are fully set out.

The book will be found very useful for dairy students and small holders, as well as for the growing class of dwellers in the country who keep a cow for their own use.

Twelfth Report of the Woburn Experimental Fruit Farm. By the Duke of Bedford, K.G., F.R.S., and S. U. Pickering, F.R.S. Pp. iv+51. (London: Amalgamated Press, Ltd., 1910.) Price 1*s.* 7½*d.* (post free).

IN this, the twelfth report issued from the Woburn fruit farm, the authors deal with the silver-leaf disease of plums and other fruit-trees in the thorough manner that characterises all their work. This disease is caused by the fungus *Stereum purpureum,* but the

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relationship is less obvious than usual, because the fungus only fructifies on the tree that it has killed, and the mycelial threads are only discoverable with difficulty on the living wood. The proof lies in the fact, well brought out in this report, that inoculation of a healthy tree with a piece of the fungus nearly always causes the disease.

As its name implies, the disease is characterised by the silvery look taken on by the leaves, due, apparently, to a disconnection of the cells. Changes in nutrition processes are, no doubt, the immediate cause, but it is suggested that the final cause is a poison formed during the growth of the fungal threads, which then spreads into the tree. This hypothesis explains, among other things, why the fungus is never found on the diseased leaves. The disease is usually fatal. All kinds of fruit are not equally susceptible; plums come first, followed by apples, laburnums, Portugal laurels, and pears as the least susceptible. If a tree recovers, it may still be badly attacked again; there was nothing to show that previous infection tends to immunise trees against subsequent attacks.

In New Zealand, where this disease is also troublesome, the application of ferrous sulphate is recommended as a remedy, but the authors cannot find that it is of any value. Indeed, no method of treatment seemed trustworthy, and all that the grower can do as yet is to burn affected trees and so prevent the disease from spreading.

Elementary Treatise on Physics, Experimental and Applied, for the Use of Colleges and Schools. Translated from Ganot's "Eléments de Physique." By Dr. E. Atkinson. Eighteenth edition, edited by Prof. A. W. Reinold, F.R.S. Pp. xiv+1225. (London: Longmans, Green and Co., 1910.) Price 15*s*.

ALL teachers and most students of physics know Ganot's "Physics," and will be interested in the appearance of another new edition. On examining the new volume they will find changes in the arrangement of subjects and chapters. In the section dealing with heat, the subjects of solution, equilibrium, and liquefaction have been put into separate chapters. Radiation is now dealt with under light. In numerous parts of the book extensive additions have been made, and much new matter on modern subjects of physics of great importance has been added. But to prevent an undue increase of size, sections dealing with matters of no interest to students of to-day have been omitted. In its new form the treatise is likely to continue its popularity. When another edition is necessary the editor should substitute a modern form of rain-gauge for that on p. 1146, and revise the section on the Gulf Stream on p. 1172, where several time-honoured fallacies are repeated.

Dunkelfeldbeleuchtung und Ultramikroskopie in der Biologie und in der Medizin. By N. Gaidukov. Pp. vi+83+Tafel v. (Jena: Gustav Fischer, 1910.) Price 8 marks.

THIS booklet gives a brief but fairly complete summary of the researches which have been pursued by means of dark ground illumination and the ultramicroscope in the domain of biology and medicine. Thus the structure of colloids and of "sols" and "gels" and the minute structure of various animal and vegetable cells as revealed by these methods are epitomised. But the methods themselves receive but the scantiest notice, the theory of the subject and the apparatus being dismissed in the space of a couple of pages. Those who desire to work at the subject will therefore have to seek instruction elsewhere. In some cases we do not think justice is done to ordinary methods of illumination; in Fig. 5, for example, a comma bacillus is depicted as being practically structureless when viewed by transmitted light, whereas with care a certain amount of structure can always be made out. Dark ground illumination no doubt does much to elucidate the finer structure of minute unicellular organisms; how far the ultramicroscope will help remains to be proved.

The work concludes with a very useful bibliography, and is illustrated with numerous figures in the text and five plates, two of which are coloured.

R. T. H.

LETTERS TO THE EDITOR.

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The Limiting Line of Sedimentation in Wave-stirred Areas.

IF you can spare the space I think I can put your reviewer (October 6, p. 433) in the way of obtaining the information he seeks as to the "limiting line of sedimentation" in "wave-stirred areas." The presence of tidal and other currents is assumed.

In a paper to the Royal Society in 1882 I chanced to hit upon this limit, experimentally and incidentally, in the following observation:—

"Dried peas placed on a glass plate in a slight depression on a sandy bottom in 6 inches of water were rolled off by waves about 12 inches long and about 1 inch high. . . .

"Shorter waves 1½ inches high had much less effect on them. A little sand that had collected on the glass was beautifully rippled with ⅛-inch ripples" (Proc. Roy. Soc., 1882, p. 16).

According to this chance experiment the limit was rather more than half the wave-length.

In 1884 I submitted to the late Sir G. G. Stokes, F.R.S., the case of a soda-water bottle, trawled at about 40 fathoms in the English Channel, which exhibited evidence that it had been subjected to long periods of quiescence, with intermittent disturbance. Sir George Stokes replied in the very important letter published in my paper on the Skerries Shoal (Trans. Devon. Association, 1887, p. 498). For publication in the same paper I had asked Lord Rayleigh to give me some simple formula for ascertaining the practical limit of wave-action. His reply was:—

"For each step downward of $\lambda/8$ divide by 2·2." I may mention that λ represents the wave-length.

Now according to this formula the disturbance at a depth of half (or four-eighths) of the wave-length is about one-twenty-third of that at the surface, whereas at the depth of five-eighths it is about one-fiftieth. I believe that one-fiftieth is negligible, whereas one-twenty-third is not always so.

Thus the limit of disturbance lies between half and five-eighths of the wave-length.

This exactly agrees with my accidental tank experiment.

For further confirmation I may refer your reviewer to Stevenson's interesting discussion on the "Level assumed by Mud a Measure of Exposure" (Stevenson on Harbours, second edition, p. 16).

I will not trouble your reviewer with my own papers except to mention one in the Linnean Society's Journal, Zoology, vol. xviii., p. 263, "On the Influence of Wave-currents on the Fauna inhabiting Shallow Seas."

At the recent inquiry on coast erosion Mr. R. H. Worth cited a delightful zoological proof of a local limit of disturbance. Speaking of *Alcyonium digitatum* and several other hydroids, Mr. Worth stated that:—

"Somewhere below 35 fathoms they will attach themselves to light bodies; above 25 fathoms they will never

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